

## Description

# Martial Arts Exercise Device and Method

### BACKGROUND OF INVENTION

[0001] For proper health, it is necessary for a person to maintain some level of cardiovascular fitness and muscle tone, but many people today do not meet that requirement in their normal activities. In fact, obesity and its related health problems are currently a rampant problem in the USA and other countries. The need to provide effective exercise devices that encourage prolonged use to combat this problem is immense.

[0002] A wide variety of methods and devices currently exist that provide effective cardiovascular and toning exercise, including those designed for martial exercise such as boxing. However, some level of physical discomfort is necessarily required for any exercise in order to achieve the desired benefit and therefore it is very typical for equipment of this type to not be used for very long, because the user does not care to continue the physical discomfort or because the exercise becomes too boring. To attempt to ad-

dress these problems, martial arts exercise devices exist that include provision for some type of interactive gaming in order to alleviate the boredom and to distract the user from the physical discomfort of the exercise. The games for prior art devices are relatively simple; for example, the device in U.S. Patent 4,088,315 simply signals the sequence of targets to be struck and verifies it. The devices' of U.S. Patents 4,401,303, 4,765,609, 5,613,925, and 5,735,775 only interactivity is to use strikers to strike at the user. The devices of U.S. Patents 4,974,833, 6,110,079, and 6,464,622 simply signal the target to be struck and indicate the location, intensity, or speed of the corresponding strike. The devices of U.S. Patents 5,503,606 and 5,509,875 simply vary the speed and direction of moving targets to be struck by the user.

[0003] Unfortunately, the games provided by the prior art devices and methods are too simple and repetitive to succeed in retaining the long-term interest of most prospective users. It is desirable to provide games that are more complex, providing a higher level of entertainment and abstract thought. A wide variety of interactive games such as computer or "video" games are known which provide interesting and prolonged entertainment, including those

with higher levels of abstraction such as strategy games and Role Playing Games (RPG), which include the feature of engaging the user in a quest-driven storyline with other characters. Video games are very successful in distraction; in fact, these games are so engrossing that they are known to be addictive to many people. It would be very desirable to combine a martial arts exercise device with video games in order to achieve the benefit of the greater entertainment and distraction, thereby prolonging the use of the exercise device. However, this has not been possible with prior art devices and methods because at least the hands and sometimes the feet are occupied with striking and perhaps with blocking, and are therefore generally unavailable to interact with the video game in any way other than striking the target. Most video games are not amenable to such a restriction; generally, with the increase in the game's complexity, more complex interactive control is required.

[0004] A related drawback of the prior art devices and methods is that they are generally very limited with respect to the number of unique games they are able to provide, in contrast with video games which are virtually infinite in variety, type, and kind. This limitation contributes to the ten-

dency of most users to discontinue the use of the exercise device after becoming bored with the available games.

[0005] A closely related problem to the aforementioned issue of obesity and poor cardiovascular health is ironically related to the appeal and attraction of video games: little or no aerobic benefit is achieved when playing, and in fact, these games are a concern due to their addictive nature and because of how many people have substituted playing these games in lieu of physical activities, especially adolescents. Most recently, there has been noted an alarming rise in the trend of obesity in children, and it appears that video games are a contributing factor. Thus, there is a need to couple video games with some form of physical activity to attempt to address this problem. However, prior art martial arts exercise devices and methods have been unable to include games with enough entertainment appeal to most attract people to their use instead of video games, despite the obvious benefits of the exercise provided, and despite the favorable interest of large numbers of health-conscious individuals and parents today.

[0006] It is significant that none of the prior art martial arts exercise devices or methods can provide to most users a level of entertainment able to encourage prolonged use due to

not having a control means for more complex games, nor are they able to provide enough variety of different games, nor are they able to provide a viable alternative to the attraction of contemporary and physically passive video games. It is clear that there is a continuing need for improved, effective devices and methods that overcome these disadvantages.

#### **SUMMARY OF INVENTION**

[0007] The solution of the present invention to the problems described previously involves the use of a set of targets, a voice recognition system, and a centrally located pixelized display device, all of which are interfaced to a computer. The computer and display device allows the playing of customized computer games suitable for some degree of martial interaction. The continuous mode voice recognition system matches voice commands to those stored in memory appropriate for the context of the game being played. In addition to the game control allowed by simply striking the targets, the voice recognition system provides practically infinite additional control capability, allowing the play of computer games of almost any complexity, which is in contrast to the prior art martial exercise devices and methods.

[0008] The visual display and computer are used to indicate which target to strike and to provide user interaction with the game based on the timing, speed, and sequence of the target strikes. The computer can also control an audio system to enhance gameplay with appropriate sound effects, speech, and music (in fact, audio cues alone can be used to indicate which target to strike). Training drills and non-game exercises can also be provided, and any of the routines (game or otherwise) can include feedback of reaction time, number of target strikes in a given time, calories burned, etc. The inclusion of the computer also facilitates connection to a network, both local and remote (internet), allowing multi-player gaming and interaction. The computer can also optionally be used to control motorized strikers, which strike at the user in accordance with game play or drill. The user would dodge or block the striker in addition to the user striking the targets and issuing voice commands. This addition can enhance the enjoyment of the exercise and allow new variation of games and drills, especially when multiple gamers are involved, such as allowing one user to remotely control the speed and timing of the other user's exercise device's strikers. Other optional computer-controlled enhancements are

listed the Detailed Description of the Preferred Embodiments.

[0009] An important advantage of this invention is how the striking of the targets and the issuing of voice commands are used in cooperation to more completely engross the user. For instance, if the game being played represents the target as a "monster" to be killed, the user would physically strike it and also be able to give voice commands to virtual game character allies that could also attack the monster. The synergism of these elements of the invention causes the user to be engaged in both the immediate physical level and a more abstract mental level, which allows a much greater enjoyment and distraction from the physical discomfort of the exercise required to play the game. This type of control can more readily capture the imagination and excitement of the user, thus greatly prolonging the length and number of exercise sessions spent with the device.

[0010] Another important advantage is how the new control capability allows an infinite number of new and distinct games to be played, instead of being limited to that subset of games that can be controlled by merely striking the targets. Typical control requirement of game characters

such as moving, attacking, using magic, etc. can be simply verbalized and therefore executed without the use of hands.

[0011] Yet another important advantage is how the present invention allows the addition of martial arts exercise to contemporary video games, which can help address the problem of physical inactivity suffered during the playing of these games, especially by adolescents. Striking devices are very appealing to adolescents especially and martial arts exercise is ideal in many ways, developing aerobic conditioning, strength, coordination, and reflexes. Until the present invention, there has not been an effective way to mate video games with martial arts exercise and the commercial availability of this device should be of great interest to the many parents concerned about their children's passive game playing.

[0012] Another advantage of the present invention is that it allows the ability to simultaneously engage in abstract game playing which can be unrelated to the martial arts exercise, such as a chess game or puzzle solving. This method is useful for allowing the subconscious to direct physical movement while allowing the conscious mind to relax and focus on the strategic thinking required by the game. This



technique has been found to be useful to develop a performance-enhancing state of mind for various athletics, such as golf, and may be developed through practice and training with the present invention.

[0013] Additional objects, advantages, and features of the invention may become apparent to the reader from the detailed description of the preferred embodiments which follows, or from the appended claims and accompanying drawings, or may be learned by practice of the invention.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0014] FIG. 1 is a front perspective partial view of a martial arts exercise device in accordance with an embodiment of the present invention.

[0015] FIG. 2 is a side perspective partial view, enlarged, of the upper and lower targets.

[0016] FIG. 3 is a fragmentary side view, enlarged, of the striker assembly, including portions broken away to illustrate certain internal features such as the motor, gears, and certain electronic components.

[0017] FIG. 4 is a side perspective partial view of certain structural elements of an embodiment of the martial arts exercise device.

[0018] FIG. 5 is a functional block diagram of a control unit relat-

ing to an embodiment of the present invention.

[0019] FIG. 6 is a main flowchart illustrating an embodiment of device operation software incorporated with game operation software.

[0020] FIG. 7 is a view of a first example game screen.

[0021] FIG. 8 is a view of a second game screen.

[0022] FIG. 9 is a top elevation view, enlarged, of a step pad optionally included in a preferred embodiment.

[0023] FIG 10. is an overall front perspective view of an expanded implementation of the preferred embodiment; including three pairs of targets, multiple displays, eight strikers, and step pad.

## **DETAILED DESCRIPTION**

[0024] Referring to FIG. 1, a partial view is depicted of a martial arts exercise device in accordance with an embodiment of the present invention. A target means is comprised of lower target 10, which is configured to receive lateral strikes from the user. Further target means is comprised of upper target 12, which is similar to lower target 10, but also includes an additional padded contour feature at the top that is arranged to receive upward-directed strikes (uppercuts) from the user. The lower target 10 is intended

to be positioned roughly at the height of the user's stomach and the upper target 12 is intended to be positioned roughly at the height of the user's head. The lower and upper targets are attached to an upright support member 14. Upright support member 14 is inserted into upright support sleeve 16 such that the upright support member 14 can telescope within the upright support sleeve 16 between certain extents. A pin (not shown) is inserted through a set of aligned holes 18 in the upright support sleeve 16 and the upright support member 14 to lock the targets at the height desired by the user, thus comprising a target adjustment means.

[0025] Also depicted in FIG. 1 is a striker means comprised of four strikers 20, which are semi-rigid padded members preferably constructed of foam or inflatable plastic. Each striker 20 is mounted at one end by insertion through striker sleeve 22. The striker sleeve 22 is rotatably mounted on motor housing and gearbox assembly 24 such that the striker sleeve 22 and striker 20 can laterally rotate toward and then away from the user. Each upper and lower motor housing and gearbox assembly 24 is mounted on upright support member 26. Upright support member 26 is inserted into its corresponding upright

support sleeve 16 and has height adjustability identical to that described for upright support member 14, thus comprising a striker adjustment means. Each motor housing and gearbox assembly 24 is electrically wired (wiring not shown) to a control means comprised of both control unit 28 and computer 30. Control unit 28 contains a Universal Serial Bus (USB) interface and other electronics, including an electronic processor, used for the control of the exercise device. Control unit 28 is electrically connected to the USB port of computer 30. Computer 30 also includes an electronic processor, and can operate through control unit 28 to activate any of the four strikers 20 independently to rotate toward and away from the user under program control.

[0026] Ports available from the audio subsystem inside computer 30 are also electrically interfaced to wireless base receiver/transmitter 32. Wireless base receiver/transmitter 32 is configured to receive and send wireless transmissions from and to wireless remote receiver/transmitter 34. Wireless remote receiver/transmitter 34 is arranged to be worn on an article of the users clothing and is electrically wired to headphone speaker 36 and microphone 38. The headphone speaker 36 and microphone 38 are arranged

to be worn on the user's head such that microphone 38 placed close to the user's mouth and headphone speaker 36 is placed close to the user's ear, and are used to allow voice commands to be received by computer 30 and for computer 30 to send audible signals to the user. Voice commands received by the computer can then be subjected to analysis in real time, so that these elements together comprise a voice command recognition means, and are operatively interfaced to the control means comprised of computer 30. The audio subsystem inside computer 30 wirelessly interfaced to headphone speaker 36 comprises an audio signaling means and can be used to provide game sound effects, music, speech effects, etc. to the user.

[0027] Also in FIG. 1, a visual signaling means is comprised of a video driver subsystem inside computer 30, which is electrically wired to computer monitor 40. Computer monitor 40 comprises a configurable pixelized display and is used in this embodiment to indicate which target to strike and when to strike it, as well as providing other related game and entertainment visual information. Computer monitor 40 is preferably placed above the upper target 12 in this embodiment, providing convenient viewing for the user.

Computer monitor 40 rests upon a monitor shelf 42. Remaining structural elements for holding computer monitor 40 and the computer 30 as well as other structural elements have been omitted in FIG. 1 for simplicity.

[0028] Referring to FIG. 2, an enlarged side perspective view of upper target 12 and lower target 10 is depicted. Each target is preferably constructed of padding covered with leather or vinyl in a rectangular shape as shown. Lower target 10 has a target mount plate 44 attached to its back surface. The target mount plate 44 includes an attached receptacle 46. A target shock absorber 48 is rigidly attached to the target mount plate by insertion of one end into receptacle 46 and is held with pin 50. A similar receptacle and pin rigidly attaches the other end of target shock absorber 48 to an upright support member 14 (not shown). Upper target 12 is similar to lower target 10 but includes an additional padded roll at the top, configured to receive upward strikes from the user, such as uppercuts in addition to lateral strikes, such as straight punches. To accommodate this feature, the mounting plate 52 for upper target 12 has a first attached bracket 54 and a second attached bracket 56. A first target shock absorber 58 is attached to bracket 54 by pin 60 and a

second target shock absorber 62 is attached to bracket 56 by pin 64. This assembly allows upper target 12 to move upward by allowing the second target shock absorber 62 to swivel in bracket 56 while first target shock absorber 58 compresses. Similarly, when upper target 12 is struck laterally, first target shock absorber 58 swivels in bracket 54 while second target shock absorber 62 compresses. The ends of target shock absorbers 58 and 62 are similarly attached to similar brackets on the upright support member 14 (not shown).

[0029] The target mount plates 52 and 44 each also include a target hit detector means comprised of an attached accelerometer integrated circuit 66. Each accelerometer integrated circuit 66 is capable of measuring acceleration in both the vertical and lateral directions and is operatively interfaced to control unit 28 by electrical wiring. In addition to providing indication of when a specific target has been hit, each accelerometer integrated circuit 66 also comprises hit strength sensing means that can discriminate the strength of the strike on the target by indicating the amount of acceleration.

[0030] Referring to FIG. 3, a fragmentary side view of the striker assembly is depicted. The motor housing and gearbox as-

sembly 24 contains an electric motor 68, which is electrically connected to regenerative inverter 70. In this embodiment, an electronic striker microcontroller 72 is electrically connected to a regenerative inverter 70. This arrangement provides a means for changing the speed of said striker by providing voltage pulses of a desired amplitude and frequency to motor 68. The striker microcontroller 72 is operatively interfaced to control unit 28 and comprises additional control means. The motor 68 is mounted to upright support member 14 by motor bolts 74. A motor gear 76 is provided for speed reduction and is coupled to an appropriately smaller gear 78 mounted on the motor shaft. The shaft of motor gear 76 passes through the motor housing and rigidly attaches to the striker sleeve 22. A short shaft 80 is attached to the top of striker sleeve 22 on one end and rotatably attaches to bracket 82 on the other end, allowing striker sleeve 22 and the striker 20 to rotate back and forth when driven by motor. Bracket 82 is rigidly attached to the motor housing, which in turn is rigidly held to upright member 14 by motor bolts 74. An optical encoder 84 is mounted underneath motor gear 76 in order to detect the position of the striker. Optical encoder 84 is electrically connected to



striker microcontroller 72.

[0031] Referring to FIG. 4, a side perspective partial view of certain structural elements of the device in FIG. 1 is depicted. Strikers and their associated upright support members have been omitted for clarity. The upright support sleeve 16 for the targets is shown to have a stabilizer member 86 rigidly attached and connecting to floor brace member 88. Three perpendicular prongs 90 are rigidly attached to stabilizer member 86. Typical weightlifting plates can be stacked onto prongs 90 to provide stabilizing weight to counter the impact of striking the targets. A container 92 could also instead be used to mount onto the prongs and filled with sand as an alternative stabilizing weight. The container 92 is preferably made of heavy-duty plastic and has a large hole 94 and associated cap 96 at the top end to pour sand in and out from. In combination, these elements all make up the target support structure.

[0032] Also included in FIG. 4 is a partial view of a monitor stand, comprised of upright monitor support member 98, monitor stabilizer member 100, and monitor floor brace member 102. An identical assembly is located on the other side of the target support structure, but has been cut away for clarity. A pin 104 passing through each of the

two monitor floor brace members 102 and into the ends of floor brace member 88 pivotally attaches the monitor floor brace members 102 to the target support structure. Both sides of the monitor stand are attached to monitor shelf 42 (shown in FIG. 1) at the top of upright monitor support members 98 and monitor stabilizer members 100. A tilt means to detect when the target as been struck too hard is comprised of a simple electronic tilt switch 106 at one junction of a monitor floor brace member 102 and floor brace member 88. Electronic tilt switch 106 is interfaced to control unit 28 and is normally closed. If either the upper or the lower target is struck so hard that the target support structure pivots upward on floor brace member 88, then the electronic tilt switch 106 will be opened and a tilt can be detected.

[0033] Referring to FIG. 5, a block diagram of the major blocks of the control unit 28 and computer 30 is depicted. Included in computer 30 is the computer processor 108. Interfaced to processor 108 is computer memory 110, wherein is stored related software instructions and the matchable target command patterns. Also interfaced to processor 108 is video converter 112, which drives the computer monitor 40. Analog To Digital Converter 114 is interfaced

to the external microphone 38 (not shown, and through a wireless receiver for the FIG. 1 embodiment, also not shown) and provides the digital sound signal to the processor 108. Digital To Analog Converter 116 is also interfaced to the processor 108 and provides the analog sound signal to the headphone speaker 36 (not shown, and through a wireless transmitter for the FIG. 1 embodiment, also not shown). In the preferred embodiment, computer 30 also contains a modem 118 to interface the processor to other modems of other computers or similar systems by telephone line. This provision allows the method of allowing multiple users to simultaneously exercise together and compete against each other.

[0034] Processor 108 is also connected to a Universal Serial Bus (USB) port 119 to receive and send data to control unit 28. Control unit 28 also contains a USB port 120 and a processor 122. The processor 122 of control unit 28 is operatively interfaced to the various portions of the martial arts exercise device such as the accelerometer integrated circuits 66 and the striker micro controllers 72 and the electronic tilt switch 106. By this arrangement, the detection of hits on the target means, the speed and timing and direction of the strikers 20, and any occurrence of tilt are

incorporated into computer 30 software programming, such as a video game program.

[0035] Referring to FIG. 6, a main flowchart is depicted of the device operation software incorporated with game operation software. ST1 is the game program section, including the main start and end of the program. ST3 is a procedure to input voice data. ST4 is a procedure to attempt to match the input voice data to a valid command stored in the program and related to the current game operation. If there is no match, then the program branches from ST4 directly back to the game program. If there is a match, then the program branches from ST4 to a procedure ST5, which will acknowledge the successful command by a visual cue on the computer monitor 30 or by an audio cue through the speaker(s) or by both. Game program ST1 can also branch to procedure ST6 which will cause one of the strikers 20 to strike at the user (appropriate to the context of the game) and then branch to procedure ST2 which will update the game features on the computer monitor 30 (such as a matching character movement) and will also update audio signals appropriate to the context of the game. ST2 is also often branched from and to game program ST1 during the game program execution. Addition-

ally, ST1 branches to procedure ST7 at appropriate moments during game play. Procedure ST7 indicates a target for the user to strike and optionally indicates the recommended type of strike such as Right Cross, Left Uppercut, Left Side Kick, etc., as listed inside ST7. This indication by ST7 can be visual on computer monitor 30, or by audio through the speaker(s), or by both. ST7 can also indicate to block a striker, but this is optional since a striker's actual physical movement is often an adequate visual cue. After procedure ST7 has executed, ST8 evaluates whether the any target has been hit or not. If not, then ST14 evaluates whether a time limit for striking the correct target has expired. If the time limit has expired, the program branches to ST12, which causes the player to be penalized in the game in some manner, such as loss of health of the player's character, or simply by loss of points. From penalizing the player in ST12, program execution returns to ST2 to update the game features. If the time expiration described in ST14 has not expired then the program continues to loop back to ST7 to indicate the target to strike and from there to ST8 to evaluate whether any target has been hit. If any target has been hit, then program execution branches from ST8 to ST9 to evaluate if the hit was

too hard (tilt). If so, then the player is warned in ST13 and then execution continues from ST12 (where the player is penalized) as described previously. If no tilt is determined in ST9, then execution branches to ST10 to determine if the correct (indicated) target has been hit. If the correct target was hit then execution branches to ST11 which rewards the player, such as by detriment to the player's computer opponent or simply by increased user points, and then branches to ST2 to update the game features. If the correct target has not been hit then execution branches to ST12 to penalize the player and then continues as described previously.

[0036] Referring to FIG. 7, a first example game screen is represented. For this example game, a map view is provided depicting a city 200, roads 202, mountains 204, a river 206, a fortress 208, a mountain pass 210, villages 211, and forests 212. Also, included is an icon 214, representing an army unit. A grid is provided by including coordinates A, B, C, D, E, F, G, H, I, J, K, L, M, N, O along the horizontal axis and coordinates 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 along the vertical axis. This game screen could appear in response to the voice command "MAP" for this example game. The coordinate system provided would allow the

movement of icons to specific locations by using vocal commands such as "MOVE ALPHA UNIT TO SECTOR D7." Target strike cues as shown in ST7 of FIG. 6 could continue to appear as an overlay on this game screen, prompting the user to strike the appropriate target while the user is focusing on overall game strategy.

[0037] Referring to FIG. 8, a second example game screen is represented. A larger, zoomed-in view of a portion of the map depicted in FIG. 7 is shown and includes a fortress 208, a larger icon representing army unit 214, and another larger icon representing an enemy army unit 216. For this example game, this view might appear in response to vocal command "ZOOM SECTOR D7." Further valid voice commands might be "ATTACK," "DEFEND," etc. The user might appear to participate directly in the local battle depicted in this figure by helping to defeat the enemy with valid and timely target strikes. In this way, the outcome of this example game would depend on both the success of the user directly by striking the correct targets as well as other strategic game play such as army unit manipulation. This example game would be very immersive and help cause the user to enjoy and prolong the workout experience. Additionally, the game could cause

the optional strikers to strike at the user in a distracting manner along with give target strike cues, and the game could also include aborted striker movements, or feints, to attempt to engage the user's attention.

[0038] An infinite variety of other games and drills can be made available with the present invention, including Role Playing Games (RPG), as well as simple drills for speed and timing, workout videos featuring an instructor to be mimicked, and so on. Sample RPG themes might be as martial artist character or as a professional boxer. An example of a simple game is Simon Says, where a combination of several strike cues is displayed and then the user must perform the strikes in correct sequence from memory. Such a game could give progressively longer sequences to remember and also become progressively faster. Other interesting games could use audio strikes cues instead of visual strike cues. For these, the computer might use audible phrases such as "BOTTOM CENTER!" or "TOP RIGHT!" to indicate which target to strike (this technique is preferably employed with multiple target sets as described in FIG. 10). Games that are unrelated to the striking of the targets and unrelated to blocking the strikers can also played, such as chess, using vocal commands. This



method can allow the user to improve his mental technique for physical action (striking and blocking), by using the subconscious to direct the physical movements while the conscious mind focuses on the strategic thinking required by the chess game.

[0039] Additional user voice commands might include "PAUSE," to pause the game; "RESUME," to continue after a PAUSE; "SET DIFFICULTY," to set the difficulty level. Difficulty levels can be related to both the Artificial Intelligence (AI) level of the computer opponent in strategy games, but also the duration, pace, and type of the strike cues. Voice commands can also be used to change the background music or to select a game from a menu or to instruct the computer to perform any other task that can otherwise be accomplished with use of a keyboard or mouse.

[0040] Referring to FIG. 9, a step detection means comprised of a step pad 316 is depicted which can optionally be used in an embodiment of the present invention. The step pad 316 may be constructed of heavy vinyl or any other suitable material and includes capacitive or resistive sensing elements in each of the eight step regions such that each region is pressure-sensitive. In this way, the step pad 316 is responsive to the weight of the user's feet and each

step region is operatively interfaced to control unit 28. A first array of pressure-sensitive sensors is comprised by inner regions 300, 302, 304, and 306 and can be incorporated into game play by requiring the user to step to a certain region. This technique can increase the aerobic benefits of the present invention by ensuring that the user is moving his or her feet in addition to striking the targets. A second array of sensors is comprised by the outer regions 308, 310, 312, and 314 can optionally be used in the same way, but with the increased distance between regions providing an added degree of difficulty and even more aerobic benefit.

[0041] Referring to FIG. 10, an expanded implementation is depicted, including three separate instances of the embodiment shown in FIG. 1, and including the step pad 316 shown in FIG. 9, and now showing a representation of a user. Many structural details have been removed from the embodiments in FIG. 10 for clarity. The inclusion of three instances of the preferred embodiment in this implementation provides three computer monitors 40, and three sets of upper targets 12, and three sets of lower targets 10. Also included are eight strikers 20. Four strikers 20 are in front of the user and configured as previously de-

scribed for FIG. 1. The instances to the right and left of the user are identical, except that an upright support member 14 and its corresponding two strikers have been eliminated from each; making a total of eight strikers 20 to engage the user in this expanded implementation. The strikers 20 to the left and right of the user will strike behind the user, prompting the user to turn his or her body to block or jump over the strikers.

[0042] Similarly the upper targets 12 and lower targets 10 will prompt the user to turn to the left and right to strike the appropriate targets. These enhanced requirements make for an even greater aerobic benefit in using the present invention, as well increasing the difficulty and the entertainment properties. The plurality of the configurable pixelized displays comprised of the additional monitors 40 to the left and the right can help increase the immersion of the user into the game or drill by showing corresponding left and right views of the game scenes in a "panoramic" type of display.

[0043] Also in FIG. 10, it is illustrated how the audio signaling means may be comprised of a plurality of audio speakers 402. In this embodiment, there are four speakers 402 shown: two in front of the user and two slightly behind (as

well as a "subwoofer," not shown). Audio speakers in this type of example configuration can provide "surround" sound to enhance the enjoyment and immersion of the game sound effects or music, as well as provide sound directionality for audible strike cues.

[0044] Additionally, it is illustrated in FIG. 10 that a plurality of microphones 400 is implemented as part of the voice command recognition means. In this implementation, two microphones 400 are located in front of the user on the left and right sides, and each are directly connected to an analog-to-digital conversion subsystem inside computer 30 (not shown). Since these microphones 400 are not located directly by the user's mouth (as it was in the implementation shown in FIG. 1), they are susceptible to exterior noise that could interfere with recognition of the user's voice commands. However, multiple microphones used in this manner are capable of differentiation of sound phase and can therefore be made to reject sounds that do not come from the target location (the user).

[0045] Note that this expanded implementation of FIG. 10 takes advantage of the modularity of the present invention and that many different combinations of targets, strikers, computer monitors, audio speakers, and microphones,

etc. can be arranged and configured as per the user's preference, skill level, and budget.

[0046] Also note that the embodiments described in FIG. 1–10 are further intended to illustrate a method of martial arts exercise comprised of providing a target means, a target hit detector means, a visual signaling means, a voice command recognition means, and a control means; where the control means executes a video game as previously described.

[0047] From the foregoing description, the reader will see that the martial arts exercise device of the present invention provides unique advantages, including much more abstract and complicated interaction than is otherwise possible for a martial arts exercise system, allowing an infinite variety of different games, providing a viable alternative to contemporary and physically passive video games, and providing much more entertaining and sustained use.

[0048] While the invention has been described with respect to preferred embodiments, it will be apparent to those skilled in the art that changes and modifications may be made without departing from the scope of the invention herein described. For example, the targets can be motorized to provide moving targets or the strikers could be

modified to provide different angles of attack such as an overhead circular swing downward or lateral straight jabs. Accordingly, the description and illustration of the invention is by way of example, and the scope of the invention is not limited to the exact details shown or described.